In-Station Diagnostic Evaluation Field Study Update

November 14, 2006

Alex Santos
California Air Resources Board

Objective of Field Study

To determine whether performance of installed In-Station Diagnostic (ISD) systems is similar to performance of ISD systems tested in certification

Summary of Field Tests

- Vapor Flow Meter Operability Test
- Vapor to Liquid (V/L) Ratio Testing
- Identification of Onboard Refueling Vapor Recovery (ORVR) equipped Vehicles
- Pressure Sensor Verification
- Vapor Pressure Sensor Ambient Reference Test

District's with Field Test Sites

- South Coast AQMD
- San Diego County APCD
- Bay Area AQMD
- Sacramento Metropolitan AQMD
- San Joaquin Valley APCD

Vapor Flow Meter Operability Test

Objective:
"Verify that vapor flow meter is operating properly"

Vapor Flow Meter Operability Test: Data Sheet

Test Run	Dispenser Fueling Point	Vapor Flow Meter serial number	ISD Daily Gross V/L Value:	V/L Test Result (1)	Difference bet. Daily Gross and (1)	Pass (P) or Fail (F)? (+/-0.15)	V/L Test Result(2)	V/L Test Result(3)	Average of (1),(2),(3)	Difference bet. Daily Gross and Average of (1),(2),(3)	Pass (P) or Fail (F)?
1	11	6565	1.15	0.97	0.18	F	0.99	1.03	1.00	0.15	P
2	5	6566	1.11	1.13	-0.02	P					
3	9	6567	0.99	0.98	0.01	P					
4	7	6527	0.94	1.23	-0.29	F	1.21	1.2	1.21	-0.27	F
4	8	6527	1.01	1.03	-0.02	P					
5	1	6518	0.99	0.96	0.03	P					
6	3	6564	1.02	1.21	-0.19	F	1.22	1.22	1.22	-0.20	F
6	4	6564	1.17	1.2	-0.03	P					

Preliminary Analysis

- **Number of test runs: 102**
- **Number of "Passed" tests: 102**

Vapor/Liquid (V/L) Ratio Testing

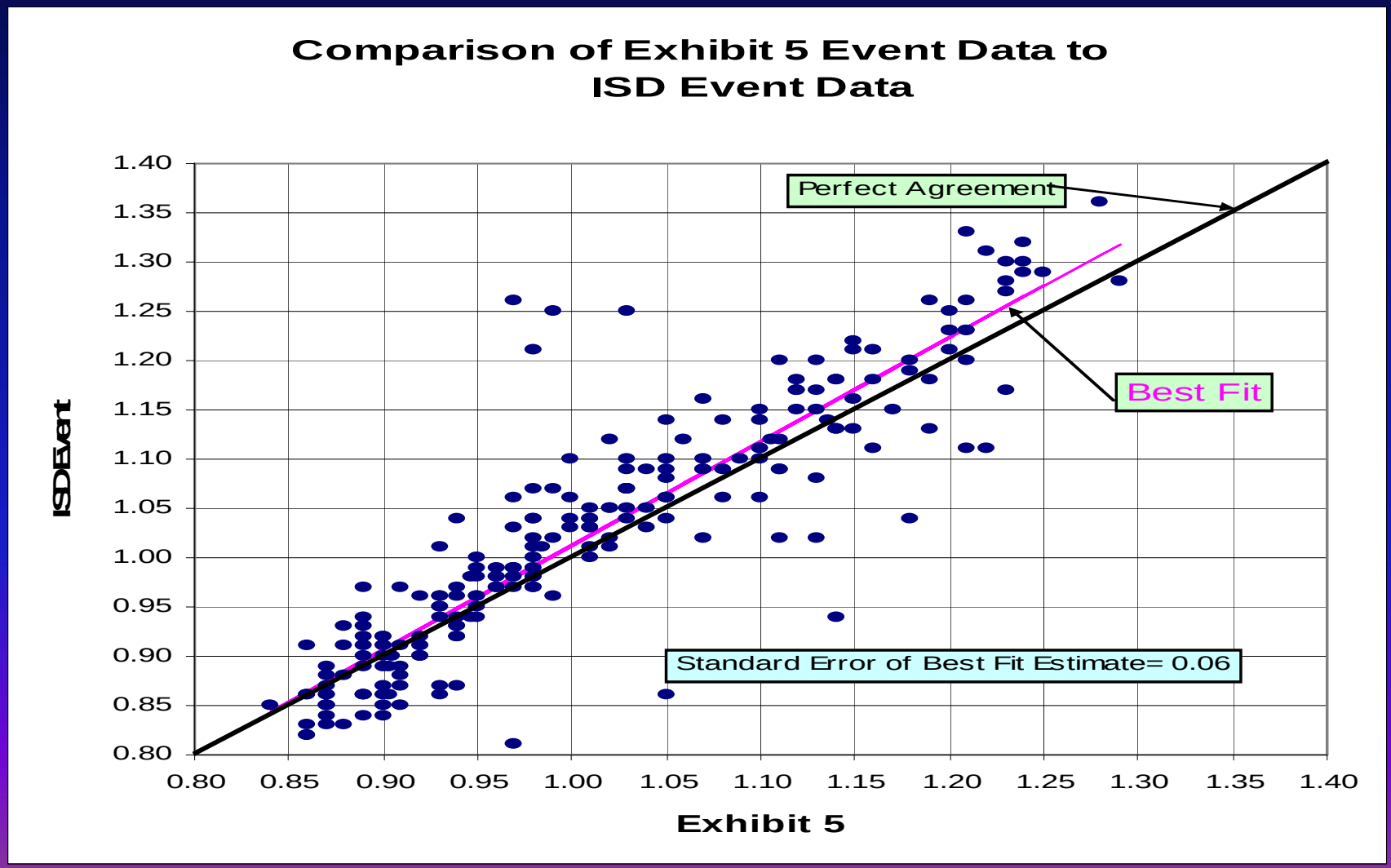
•Objective 1: "Determine how closely the Veeder-Root ISD system compares to the V/L method"

•Objective 2: "Determine whether the V/L Malfunction Criteria for Gross and Degradation failures (Section 10.2.1 (b) and (c) of CP-201) can be tightened without compromising the reliability of the assessment"

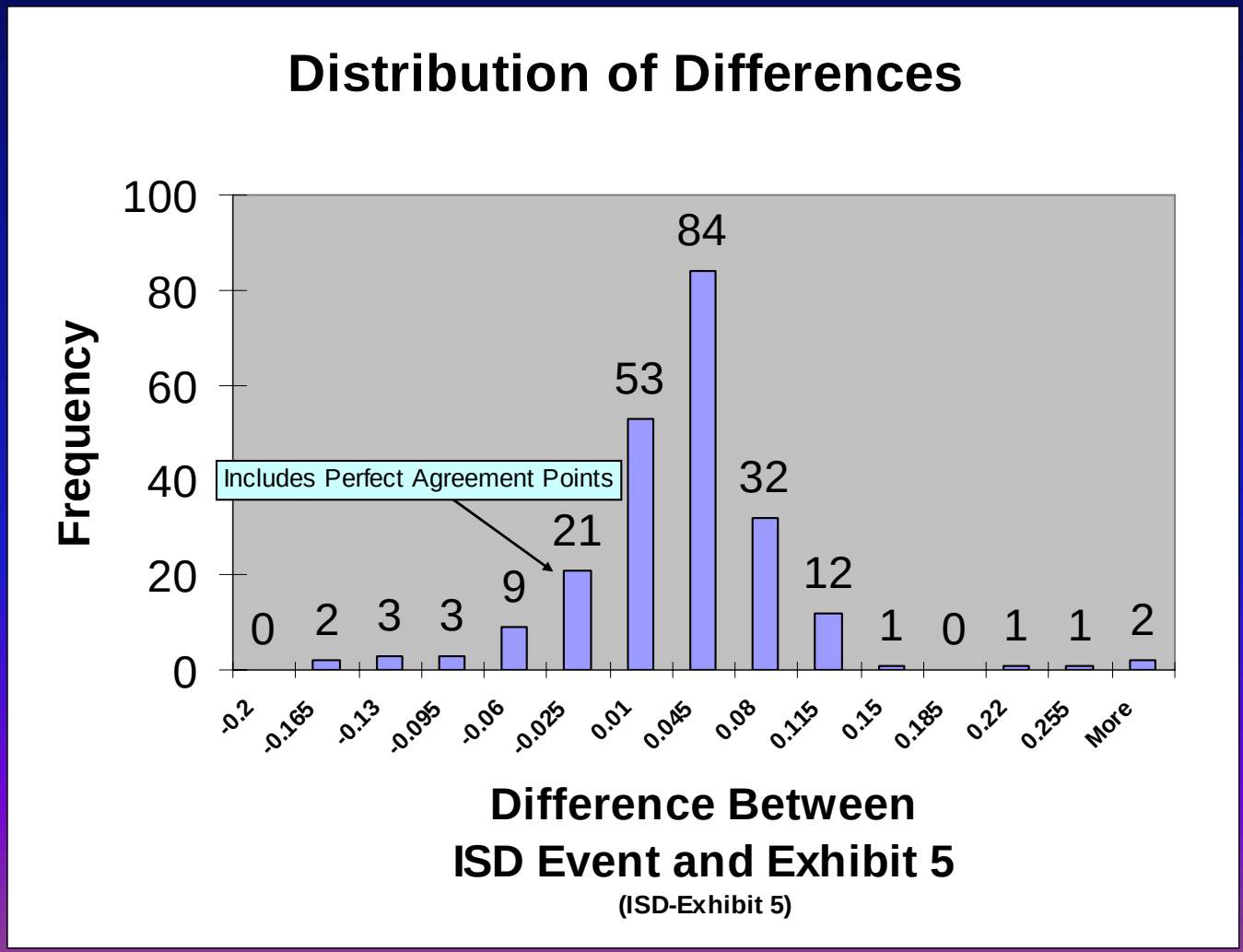
Vapor/Liquid (V/L) Ratio Testing: Data Sheet

Run	Pump #	ISD V/L Daily Average	ISD V/L Weekly Average	Fuel Grade	Nozzle Name / Serial #	Initial Dispenser Totalizer, Gallons	Total Dispenser Totalizer Gallons	Total Gas Pumped Gallons	Time Seconds	Flow Rate, gpm	Initial Meter Reading ft3	Final Meter Reading ft3	Calculated V/L (A)	ISD V/L Instantaneous (B)	V/L Difference (A-B)	Time of Each Test
Meter Correction Factor: 1.00015					**Pre-Test Leak Check -** Start Pressure: 5.052					End Pressure: 5.028						
1	5	1.11	1.08	87	4005212	0.000	4.765	4.77	36.54	7.82	0.00	0.72	1.13	1.02	-0.11	10:20 AM
2	5	1.11	1.08	87	4005212	0.000	4.756	4.76	38.86	7.34	0.00	0.73	1.15	1.22	0.07	10:24 AM
1	3	1.02	0.97	87	4005210	0.000	4.872	4.87	37.58	7.78	0.00	0.79	1.21	1.11	-0.10	10:30 AM
3	3	1.02	0.97	87	4005210	0.000	4.552	4.55	38.17	7.16	0.00	0.74	1.22	1.31	0.09	10:36 AM
4	3	1.02	0.97	87	4005210	0.000	4.675	4.68	40.08	7.00	0.00	0.76	1.22	1.11	-0.11	10:40 AM
1	2	0.99	0.97	87	4005207	0.000	4.748	4.75	38.79	7.34	0.00	0.61	0.96	0.98	0.02	10:54 AM
2	2	0.99	0.97	87	4005207	0.000	4.733	4.73	37.87	7.50	0.00	0.60	0.95	0.94	-0.01	11:00 AM
1	7	0.94	0.95	87	4005209	0.000	4.691	4.69	60.08	4.68	0.00	0.77	1.23	1.27	0.24	11:09 AM
2	7	0.94	0.95	87	4005209	0.000	4.632	4.63	60.15	4.62	0.00	0.75	1.21	1.33	0.12	11:13 AM
3	7	0.94	0.95	87	4005209	0.000	4.747	4.75	61.67	4.62	0.00	0.76	1.20	1.23	0.03	11:18 AM
1	8	1.01	1.01	87	206637	0.000	4.714	4.71	58.16	4.86	0.00	0.65	1.03	1.07	0.02	11:30 AM
1	10	0.99	0.94	87	4005213	0.000	4.724	4.72	53.60	5.29	0.00	0.62	0.98	1.21	0.23	11:36 AM
1	12	1.15	1.10	87	4005211	0.000	4.650	4.65	52.55	5.31	0.00	0.06	0.97	1.26	0.29	11:40 AM
2	12	1.15	1.10	87	4005211	0.000	4.677	4.68	53.52	5.24	0.62	0.99	0.99	1.25	0.26	11:43 AM
3	12	1.15	1.10	87	4005211	0.000	4.655	4.66	53.84	5.19	0.64	1.03	1.03	1.25	0.22	11:48 AM
Post-Test Leak Check - Start Pressure: 5.048											End Pressure: 5.031					

Vapor/Liquid (V/L) Ratio Testing: Preliminary Analysis of Data Collected



Vapor/Liquid (V/L) Ratio Testing: Preliminary Analysis of Data Collected



Identification of Onboard Refueling Vapor Recovery (ORVR) Equipped Vehicles

Identification of Onboard Refueling Vapor Recovery (ORVR) Equipped Vehicles

Objective : "Determine if the Healy ISD System effectively identifies Onboard Refueling Vapor Recovery (ORVR) and non-ORVR vehicles such that V/Ls can be adequately identified per CP-201 criteria."

Identification of Onboard Refueling Vapor Recovery (ORVR) Equipped Vehicles: Data Sheet

Year	Make	Model	Fueling Point	Starting Dispensing Time	Gallons Dispensed	V/L from TLS	ORVR Vehicle?	Did ISD Make Correct Assesment?
1996	Toyota	Tacoma	10	11:47:00 AM	6.90	1.01	NO	YES
2005	Chevy	Impala	5	11:53:00 AM	5.52	0.44	YES	YES
1996	Saturn		1	11:59:00 AM	8.77	1.18	NO	YES
2005	Infiniti	G35	2	12:04:00 PM	15.34	1.09	YES	**NO**
1984	Toyota	4Runner	1	12:12:00 PM	5.06	1.16	NO	YES
2004	Honda	Civic	7	12:14:00 PM	9.55	0.30	YES	YES
2003	Honda	Odyssey	12	11:53:00 AM	14.48	0.23	YES	YES
2004	GMC	Sierra	11	11:56:00 AM	22.94	0.54	YES	**NO**
2000	Audi	A4	12	12:02:00 PM	9.22	0.24	YES	YES
1996	Buick	Park Avenue	10	12:13:00 PM	8.68	0.71	NO	YES
1997	Jeep	Grand Cherokee	11	12:16:00 PM	7.30	1.10	NO	YES
1996	Acura	3.2 TL	11	12:20:00 PM	7.88	1.06	NO	YES
2003	Ford	Windstar	3	11:56:00 AM	23.23	0.30	YES	YES
1995	Ford	Crown Victoria	6	11:55:00 AM	17.37	1.16	NO	YES
2004	GMC	Denali Yukon	11	12:10:00 PM	6.45	0.28	YES	YES
2000	Toyota	Avalon	2	12:15:00 PM	10.42	1.09	YES	**NO**
2003	Lincoln	LS	6	12:20:00 PM	3.23	0.80	YES	**NO**

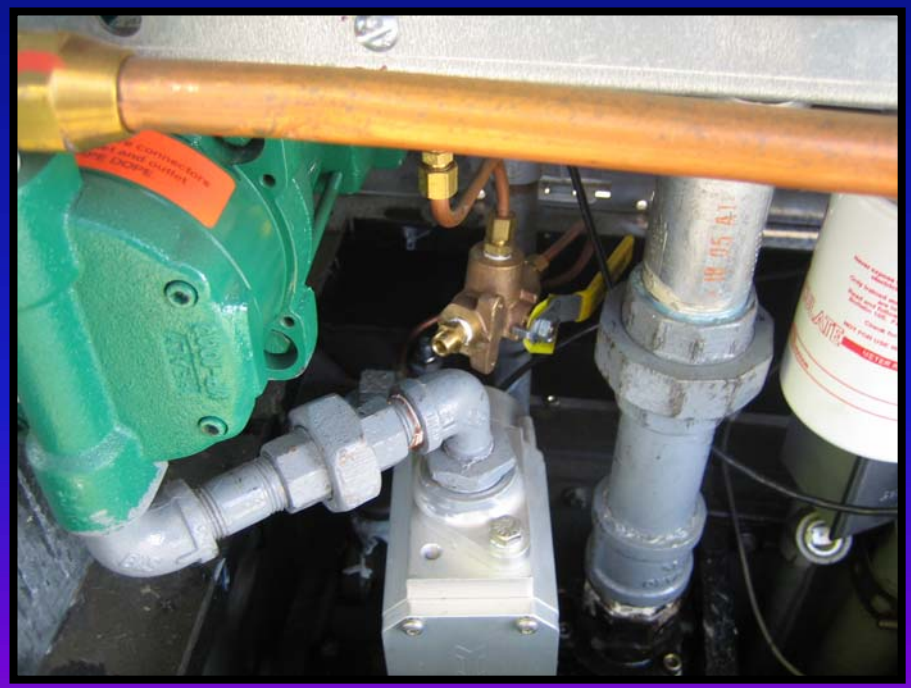
Identification of Onboard Refueling Vapor Recovery (ORVR) Equipped Vehicles

	Number of ORVR	Number of Non-ORVR
Staff Identification	152	137
ISD Correct Recognition	117	132
ISD Incorrect Recognition	35	5

- 35 events that should have been discarded were included in the ISD V/L Daily and Weekly Averages

Pressure Sensor Verification

Objective: "Verify that the pressure sensor is operating properly"



Pressure Sensor Verification :
Data Sheet

TEST 1			
Pressure Sensor Location			
Fueling Point Numbers:	FP 1	FP 2	
Pressure Sensor Serial Number			
Serial Number:	1227		
Non-Calibrated Sensor Value			
Inches of Water Column:	0.099	Must be between +0.20 and -0.20	

- **<u>Preliminary Analysis</u>:**
- **Number of tests run: 15**
- **Number of "passed" tests: 15**

Vapor Pressure Sensor Ambient Reference Test

<u>Objective</u>: Monitor UST pressure to determine "how closely the Veeder Root ISD system pressure sensor value compares to the monitored value."

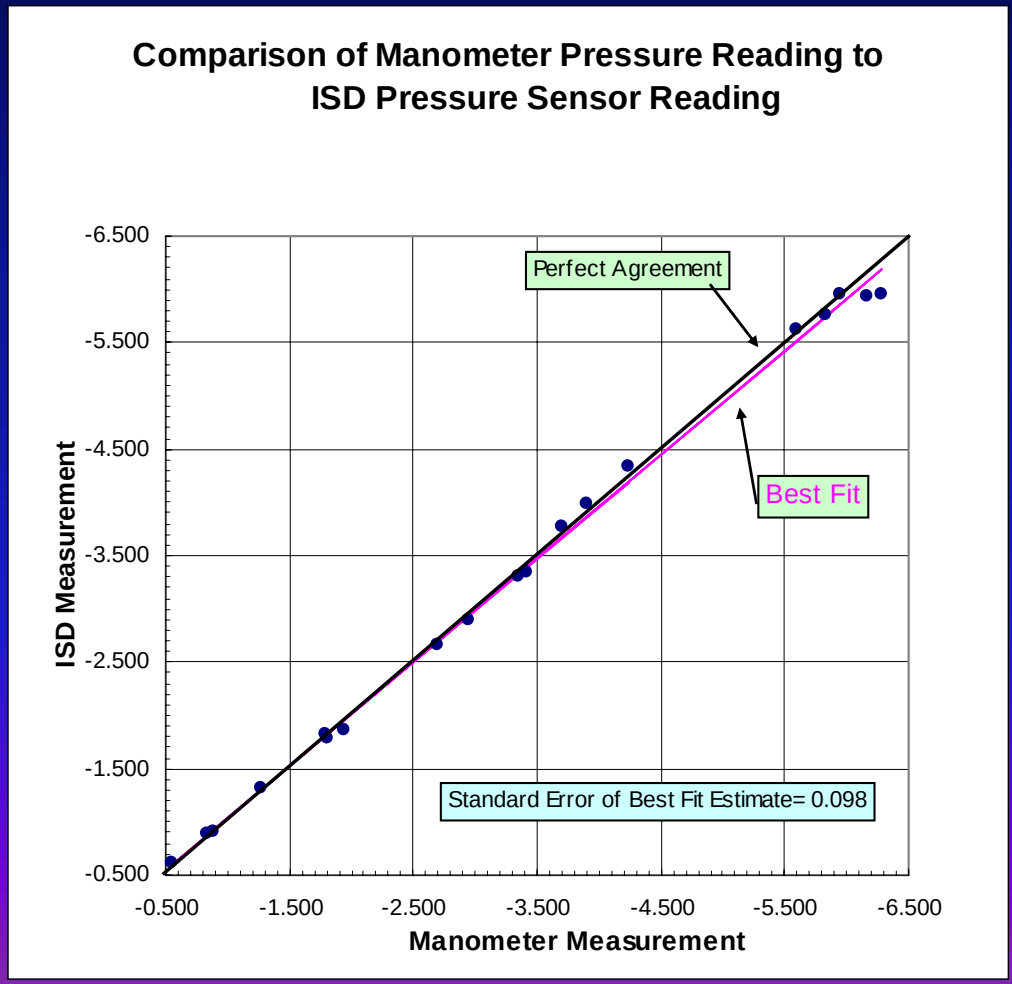
Vapor Pressure Sensor Ambient Reference Test : Data Sheet

Observed Ambient Temperature (Cannot Exceed +/- 5 degrees F)		Observed Underground Storage Tank Pressure		
		Manometer Reading (inches H2O)	TLS Reading (inches H2O)	Difference
Initial Ambient Temperature (Degrees F):	81.5	-5.660	-6.000	*
Final Ambient Temperature (Degrees F):	82.1	-5.411	-6.000	*
Ambient Temperature Change (Degrees F):	0.6			

Observed Ambient Temperature (Cannot Exceed +/- 5 degrees F)		Observed Underground Storage Tank Pressure		
		Manometer Reading (inches H2O)	TLS Reading (inches H2O)	Difference
Initial Ambient Temperature (Degrees F):	96.2	-3.350	-3.297	0.053
Final Ambient Temperature (Degrees F):	97.5	-3.700	-3.765	-0.065
Ambient Temperature Change (Degrees F):	1.3			

"*" was inserted in the tables where the difference wasn't calculated since the TLS was at the end of its scale, either -6.00 or 6.00.

Vapor Pressure Sensor Ambient Reference Test: Preliminary Analysis of Data Collected



ARB ISD In-Use Evaluation Contacts

- Joe Guerrero
  - jguerrero@arb.ca.gov (916) 324-9487
- Alex Santos
  - asantos@arb.ca.gov (916) 324-1003
- Vince Bunac
  - vbunac@arb.ca.gov (916) 327-7420

www.arb.ca.gov/vapor/vapor.htm

District ISD In-Use Evaluation Contacts

- **Lou Roberto**
  - South Coast AQMD (909) 396-2349
- **Randy Smith**
  - San Diego County APCD (858) 586-2677
- **John Marvin**
  - Bay Area AQMD (415) 749-5190
- **Isam Boulad**
  - Sacramento Metro AQMD (916) 874-4859
- **Morgan Lambert**
  - San Joaquin Valley APCD (559) 230-5945

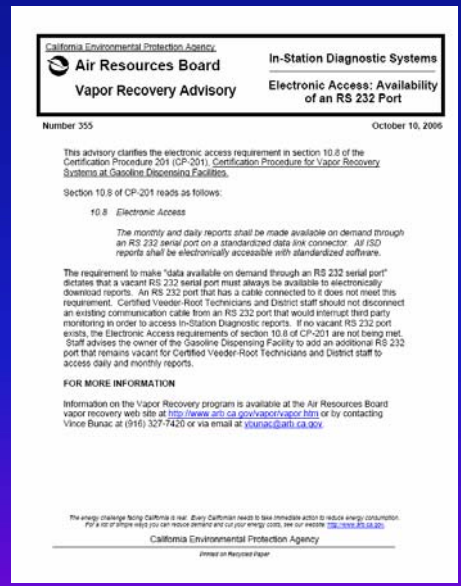
Latest Draft of ISD Protocol

- Latest Draft Posted on Website September 28, 2006
- Update Summary:
  - Include Text of Enforcement Protocol as Attachment
  - Order of Tests Specified
  - Modified Leak Evaluation Criteria of Pressure Sensor Verification Test

Air Resources Board
Vapor Recovery Advisory
Number 355
October 10, 2006

In-Station Diagnostic Systems
Electronic Access: Availability of an RS 232 Port

- Requirement of section 10.8 of CP-201.
- Requires that a vacant RS 232 port must always be available to electronically download reports.
- If no vacant RS 232 port exists, Gasoline Dispensing Facility owners must install an additional RS 232 port that remains vacant for Certified Veeder-Root Technicians and District staff to access daily and monthly reports.



California Environmental Protection Agency

Air Resources Board

Vapor Recovery Advisory

In-Station Diagnostic Systems

Electronic Access: Availability of an RS 232 Port

Number 355

October 10, 2006

This advisory clarifies the electronic access requirement in section 10.8 of the Certification Procedure 201 (CP-201), Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities.

Section 10.8 of CP-201 reads as follows:

10.8 Electronic Access

The monthly and daily reports shall be made available on demand through an RS 232 serial port on a standardized data link connector. All ISD reports shall be electronically accessible with standardized software.

The requirement to make "data available on demand through an RS 232 serial port" dictates that a vacant RS 232 serial port must always be available to electronically download reports. An RS 232 port that has a cable connected to it does not meet this requirement. Certified Veeder-Root Technicians and District staff should not disconnect an existing communication cable from an RS 232 port that would interrupt third party monitoring in order to access In-Station Diagnostic reports. If no vacant RS 232 port exists, the Electronic Access requirements of section 10.8 of CP-201 are not being met. Staff advises the owner of the Gasoline Dispensing Facility to add an additional RS 232 port that remains vacant for Certified Veeder-Root Technicians and District staff to access daily and monthly reports.

FOR MORE INFORMATION

Information on the Vapor Recovery program is available at the Air Resources Board vapor recovery web site at http://www.arb.ca.gov/vapor/vapor.htm or by contacting Vince Bunac at (916) 327-7420 or via email at vbunac@arb.ca.gov.

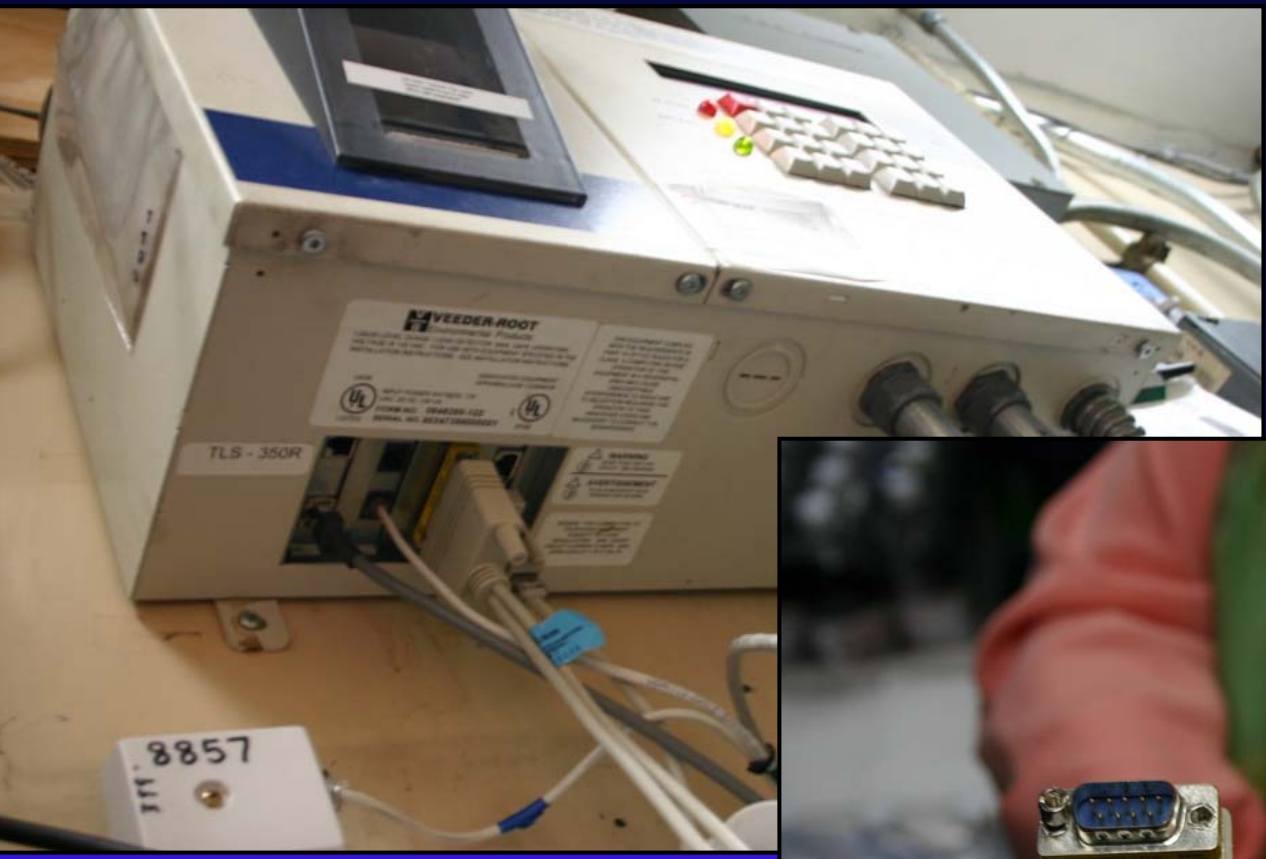
The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website http://www.arb.ca.gov.

California Environmental Protection Agency

Printed on Recycled Paper

Illustration of an available RS 232 port

ISD Data Download



Questions?